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(54) Membrane dielectric isolation ic fabrication

(57) General purpose methods for the fabrication of integrated circuits (24, 26, 28, ... 30) from flexible membranes (20, 36) formed of very thin low stress dielectric materials, such as silicon dioxide or silicon nitride, and semiconductor layers. Semiconductor device (24, 26, 28, ... 30) are formed in a semiconductor layer of the membrane (36). The semiconductor membrane layer (36) is initially formed from a substrate (18) of standard thickness, and all but a thin surface layer of substrate is then etched or polished away. In another version, the flexible membrane is used as support and electrical interconnect for conventional integrated circuit die bonded thereto, with the interconnect formed in multiple layers in the membrane. Multiple die can be connected to one such membrane which is then packaged as a multichip module. Other applications are based on (circuit) membrane processing for bipolar and MOSFET transistor fabrication, low impedance conductor interconnecting fabrication, flat panel displays, maskless (direct write) lithography, and 3D 1C fabrication.

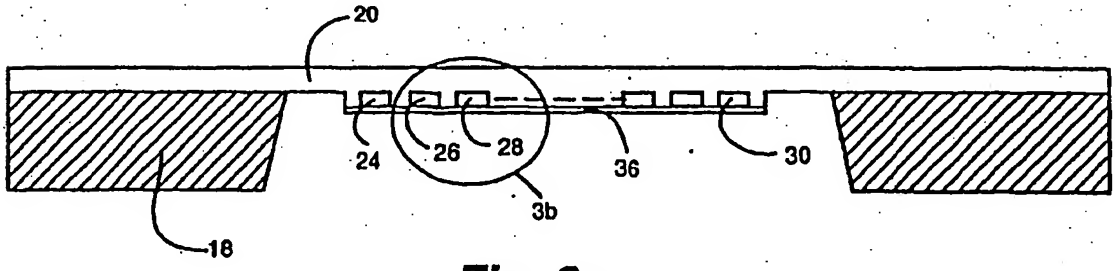

Fig_3a

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EUROPEAN SEARCH REPORT

Application Number
EP 02 00 9643

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
X	US 4 693 770 A (HATADA KENZO) 15 September 1987 (1987-09-15) * the whole document * ---	1-4,7	H01L25/065 H01L21/60
X	PATENT ABSTRACTS OF JAPAN vol. 014, no. 263 (E-0938), 7 June 1990 (1990-06-07) -& JP 02 082564 A (NEC CORP), 23 March 1990 (1990-03-23) * abstract * ---	1-5,7,8	
X	"PARTITIONING FUNCTION AND PACKAGING OF INTEGRATED CIRCUITS FOR PHYSICAL SECURITY OF DATA" , IBM TECHNICAL DISCLOSURE BULLETIN, IBM CORP. NEW YORK, US, VOL. 32, NR. 1, PAGE(S) 46-49 XP000033241 ISSN: 0018-8689 * the whole document * ---	1-4,7	
X	PATENT ABSTRACTS OF JAPAN vol. 016, no. 303 (E-1228), 3 July 1992 (1992-07-03) -& JP 04 083371 A (TOSHIBA CORP), 17 March 1992 (1992-03-17) * abstract * ---	1-4,7	TECHNICAL FIELDS SEARCHED (Int.Cl.5) H01L
P,X	PATENT ABSTRACTS OF JAPAN vol. 016, no. 352 (E-1241), 29 July 1992 (1992-07-29) -& JP 04 107964 A (HITACHI LTD), 9 April 1992 (1992-04-09) * abstract; figures 1-3 * ---	1-4,7,8	
	-/—		

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 October 2002	Zeisler, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
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& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

European Patent Office

Application Number
EP 02 00 9643

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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EUROPEAN SEARCH REPORT

Application Number
EP 02 00 9643

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
P,X	PATENT ABSTRACTS OF JAPAN vol. 016, no. 521 (E-1285), 27 October 1992 (1992-10-27) -& JP 04 196263 A (MITSUBISHI ELECTRIC CORP), 16 July 1992 (1992-07-16) * abstract *	1-4,7	
X	WO 92 03848 A (LSI LOGIC EUROP) 5 March 1992 (1992-03-05) * the whole document *	9-11	
X	US 4 897 708 A (CLEMENTS KEN) 30 January 1990 (1990-01-30) * the whole document *	9,10	
X	PATENT ABSTRACTS OF JAPAN vol. 016, no. 291 (E-1224), 26 June 1992 (1992-06-26) -& JP 04 076946 A (FUJITSU LTD), 11 March 1992 (1992-03-11) * abstract *	9,10	
X	EP 0 314 437 A (LASER DYNAMICS INC) 3 May 1989 (1989-05-03) * the whole document *	9,10	TECHNICAL FIELDS SEARCHED (Int.Cl.5)
X	DE 32 33 195 A (MITSUBISHI ELECTRIC CORP) 17 March 1983 (1983-03-17) * the whole document *	9,10	
A	US 4 983 251 A (HAISMA JAN ET AL) 8 January 1991 (1991-01-08) * column 6, line 19 - line 66; figure 18 *	11	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 October 2002	Zeisler, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 02 00 9643

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-8

   Compression bonding first and second integrated circuits

2. Claims: 9-11

   Method of information processing through vertical transmission paths

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 02 00 9643

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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08-10-2002

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4693770 A	15-09-1987	JP 1693579 C	17-09-1992
		JP 3057618 B	02-09-1991
		JP 62009642 A	17-01-1987
		DE 3686457 D1	24-09-1992
		DE 3686457 T2	11-02-1993
		EP 0208494 A2	14-01-1987
		KR 9008665 B1	26-11-1990
JP 02082564 A	23-03-1990	NONE	
JP 04083371 A	17-03-1992	NONE	
JP 04107964 A	09-04-1992	NONE	
JP 04196263 A	16-07-1992	NONE	
WO 9203848 A	05-03-1992	WO 9203848 A2	05-03-1992
US 4897708 A	30-01-1990	US 4954875 A	04-09-1990
JP 04076946 A	11-03-1992	NONE	
EP 0314437 A	03-05-1989	US 4954875 A	04-09-1990
		DE 3872828 D1	20-08-1992
		DE 3872828 T2	11-02-1993
		EP 0314437 A1	03-05-1989
		JP 2001152 A	05-01-1990
		JP 2117118 C	06-12-1996
		JP 8017223 B	21-02-1996
DE 3233195 A	17-03-1983	JP 58043554 A	14-03-1983
		DE 3233195 A1	17-03-1983
US 4983251 A	08-01-1991	NL 8501773 A	16-01-1987
		AU 585355 B2	15-06-1989
		AU 5885486 A	24-12-1986
		CA 1245776 A1	29-11-1988
		DE 3676367 D1	07-02-1991
		EP 0209173 A1	21-01-1987
		ES 556144 D0	01-07-1987
		ES 8707023 A1	16-09-1987
		JP 2608548 B2	07-05-1997
		JP 61294846 A	25-12-1986

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82